

## 5.4 Factoring Polynomials

GCF

ex 1:

$$3x^2 + 6x$$

$$3x(x + 2)$$

ex 4:

$$8x^2 + 14x + 5$$

$$\begin{array}{l} \text{stretch} \\ \underline{8x^2 + 4x} + \underline{10x + 5} \\ 4x(2x+1) + 5(2x+1) \\ (2x+1)(4x+5) \end{array}$$

$$\begin{array}{r} 40 \\ 4 \quad \times \quad 10 \\ 14 \end{array}$$

ex 6:

$$x^3 - 12x^2 + 36x$$

$$x(x^2 - 12x + 36)$$

$$x(x - 6)^2$$

Regular

ex 2:

$$x^2 - 2x - 8$$

$$(x - 4)(x + 2)$$

ex 3:

$$6x^2 - 11x - 10$$

$$(6x^2 - 15x + 4x - 10)$$

$$3x(2x - 5) + 2(2x - 5)$$

$$(2x - 5)(3x + 2)$$

$$\begin{array}{r} -8 \\ -4 \quad \times \quad 2 \\ -2 \end{array}$$

+c same sign  
-c different signs

$$\begin{array}{r} -60 \\ -15 \quad \times \quad 4 \\ -1 \end{array}$$

Patterns

$$\text{i. } a^2 - b^2 = (a - b)(a + b)$$

$$\text{ii. } a^2 - 2ab + b^2 = (a - b)^2$$

$$\text{iii. } a^2 + 2ab + b^2 = (a + b)^2$$

2m

ex 5:

$$4m^2 + 4m + 1$$

$$(2m + 1)^2$$

ex 7:

$$y^2 - 49$$

$$(y + 7)(y - 7)$$

ex 8:

$$4x^{10} - 9y^8$$

$$(2x^5 + 3y^4)(2x^5 - 3y^4)$$

ex 9:

$$4x^{2n} - 16y^{4n}$$

$$4(x^{2n} - 4y^{4n})$$

$$4(x^n + 2y^{2n})(x^n - 2y^{2n})$$

If a problem is not factorable,  
then write:

Prime

## 2 New Patterns

iv.  $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$   
Sum of cubes

v.  $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$   
Difference of cubes

$$\begin{array}{ll} 1^3 = 1 & 4^3 = 64 \\ 2^3 = 8 & 5^3 = 125 \\ 3^3 = 27 & 6^3 = 216 \end{array}$$

ex 10:

$$8u^3 + v^3$$

$$(2u + v)(4u^2 - 2uv + v^2)$$

ex 11:

$$27x^3 + y^3$$

ex 12:  
 $64 - x^3$

ex 13:  
 $x^6 - y^6$

Four term (or five term) Polynomials  
(Grouping)

ex 14:  
 $xy + 5x + 3y + 15$

ex 15:  
 $ax + bx + a + b$

HW:  
p242-243  
15-39odd